tudinal axis of its body and the ædeagus is in turn directed at right angles to the position of the gaster, almost horizontally and inserted into the vagina of the female. During copulation, the anterior half of the gaster of the female is stroked by the antennae of the male. Other alate males also try to climb over the copulating male to have access to the female but they slip and drop down. The female mostly keeps walking about slowly, carrying the copulating male on the dorsal side of its gaster. The male and the female separate after about fifteen minutes.

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22. VARIOUS ASSOCIATES OF SESSILE BARNACLES IN BOMBAY WATERS

Introduction

Numerous instances of associations ranging from simple commensalism to total parasitism and symbiosis are to be abundantly found in literature. Majority of these associations occur in the crowded littoral and sublittoral zones as there is often competition for space. Cirripedes, being a major sedentary component of the biota and occupying a great deal of area, contribute towards such relationships to a great extent. These relationships, it is reported, range from sea-weeds to whales, numbering about 2000 species of living organisms. In this account an attempt has been made to compile the list of organisms that were found associated with the balanomorphs found around Bombay.

Material and methods

Collections of sessile barnacles were made at random and brought to the laboratory. The associates from the shells were removed carefully, narcotised, if necessary, so as to obtain them in fully extended state and then preserved.

Observations

Organisms ranging from algae to mollusca found associated with barnacles are described below.

The algal associates included *Ulva lactuca* Linn., *Enteromorpha* sp., *Laurentia* sp., *Polysiphonia forrulacea*, Suhr, *Gelidium heteroplatos* and the calcareous form *Cheilosporum spectabilis*. All the algae were associated with *Balanus tintinnabulum*.

Fairly good number of sponges were found covering the shells of *Balanus amaryllis* at Chowpatty. This association was not observed at any other locality. Further classification of these sponge specimens is yet to be completed. Among the coelenterates associated with barnacles were *Sertularia* sp., *Cribrinopsis* sp. and *Diadumene schilleriana* (Stoliczka). Forms of *Sertularia* sp. were found as dense colonies anchored on *B. tintinnabulum* shells. The lattter two, the *Actinozoans*, were associated with *B. amaryllis* shells. The forms of *Cribrinopsis* sp. were characterised by light pink column covered with weakly developed red verrucae on its distal one-third region. These forms were of quite common occurrence. The occurrence of *Diadumene* along with barnacles has been previously recorded by Annandale (1907) and Bhatt (1959).

The errantian polychaetes included *Nereis talehsapensis* (Fauvel). These worms were small, thin and tapered posteriorly and showed certain differences in the teeth compared to Fauvel's description (Fauvel 1932). In addition, forms of *Perinereis nigro-punctata* Horst were also observed and some had the characteristic colour pattern on the dorsal surface of anterior segments. These polychaetes were associated with *B. tintinnabulum* and *B. amaryllis*.

The sedentary polychaetes consisted of *Polydora coeca* Oersted and *Dasychone serratibranchis* Grube. The former were found in great number at Chowpatty forming a distinct zone below that of *B. amphitrite*. Sometimes a few segments of their bodies, especially the anterior, were found among the clusters of barnacle shells. It is reported that this form bores into coral rocks and shells. Similar activity by them as regards barnacle shells may occur. The latter form viz. *D. serratibranchis* were found occasionally, attached to *B. amaryllis* shells collected at Cuffe Parade and Chowpatty.

The crustacean associates included isopods, amphipods and cirripedes. Of the isopods, two species occurred *Sphaeroma walkeri* Stebbing and *S. annandeli* Stebbing. Both were abundant among the shells of *B. amphitrite*. The boring nature of *S. annandeli* has been earlier proved by Erlanson (1936) and Pillai (1955). The mandibles of these forms have a cutting edge, formed of two, well-separated and powerful teeth.

Between their cutting edge and the strong molar is a series of small spines. As regards *S. walkeri* its boring nature is doubtful and contradictory opinions have been expressed by various workers. Ganapati & Nagabhushnam (1955), Srinivasan (1955) and Palekar (1957) have regarded it as a wood or rock borer. However, Calman (1919), Baker (1928), Pillai (1955) and Bhatt (1959) do not consider it a borer. Amphipods belonging to suborder Gammaridea were abundantly associated with all the species of balanomorphs. Among the cirripedes, *Ibla cumingi* was found attached to *B. tintinnabulum* at Bandra. Darwin (1854) and Hiro (1937) had similarly found these forms attached to *Pollicipes mitella* and *Mitella mitella* respectively. In India, however, they have been recorded so far as attached to rocks only (Patil 1951; Daniel 1956; Bhatt 1959).

The molluscan associates included the shells of *Acanthochitona mahensis* Winckworth; *Littorina intermedia* Phil., *Drupa konkanensis* Melvill, *Thais* sp. (probably *rudolphi*), *Arca bistrigata* Dunker, *Modiolus striatulus* Linn., *Brachyodontes karachiensis* Melvill and *Ostrea cuculata*. In addition, the egg cases of some molluscs were also found attached to barnacle shells.

Conclusion

The exact relationship of these organisms is not known and hence they have been grouped under the broad heading of associates. Most of the relationships might have originated fortutiously. However, more complex relationships are possible.

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23. ON A NEWLY RECORDED HOST SPECIES OF *DENDROPHTHÖE FALCATA* (L.F.) ETTINGSH

During a random survey of phanerogamic parasites in the Indian Botanic Garden, Calcutta, I noted an infestation by the very common flowering parasite, *Dendrophthöe falcata* (L.f.) Ettingsh. on *Ropalocarpus lucidus* Boj. This host species appears to be a new record and may be added to the hosts of the parasite, which now number 331.

BOTANICAL SURVEY OF INDIA, R. B. GHOSH
INDIAN BOTANIC GARDEN,
SIBPORE,
HOWRAH,
July 4, 1969.

[See note No. 29 which concerns the same species but under a synonym—EDS.]

24. OCCURRENCE OF *CERATOPTERIS THALICTROIDES* (LINN.) BRONGN. IN RAJASTHAN

During the course of a botanical exploration of south-eastern part of Rajasthan, the author made extensive collections of ferns and fern allies. The fern *Ceratopteris thalictroides* (Linn.) Brongn., has not been reported earlier from any locality in Rajasthan, and its